Claims

1. An isolated Band 3 polypeptide comprising an amino acid sequence selected from the group consisting of SEQ ID NO. 1, 2, 3, and 4 as shown herein:

SEQ ID NO:1: GMPWLSATTVRSVTHANALT (also referred to herein as sequence $B3_{5A}$);
SEQ ID NO:2: SVTHANALTVMGKASTPGAA (also referred to herein as sequence $B3_{5B}$);
SEQ ID NO:3: GKASTPGAAAQIQEVKEQRI (also referred to herein as sequence $B3_{5C}$);
SEQ ID NO:4: DRILLLFKPPKYHPDVPYVK (also referred to herein as sequence $B3_{6A}$); and unique fragments thereof, wherein the unique fragments

(1) bind to an MSP-1 polypeptide and

(2) exclude the sequences set forth in Table 4:Band 3 Blast Homology Sequences.

2. An isolated nucleic acid molecule that encodes the isolated polypeptide of claim 1.

3. An expression vector comprising the isolated nucleic acid of claim 2 operably linked to a promoter.

4. A host cell transfected or transformed with an expression vector of claim 3.

5. An immunogenic composition comprising:
one or more isolated polypeptides of claim 1; and
a pharmaceutically acceptable carrier;
wherein the polypeptides are present in an effective amount to induce an immune system response.

6. The composition of claim 5, further comprising an adjuvant.

7. A method of making a medicament, comprising:

placing one or more isolated polypeptides of claim 1 in a pharmaceutically acceptable carrier.

8. A method for identifying a candidate mimetic of an isolated polypeptide of claim 1, comprising

providing an MSP-1 polypeptide which binds the isolated polypeptide of claim 1,

contacting the MSP-1 polypeptide with a test molecule, and

determining the binding of the test molecule to the MSP-1 polypeptide, wherein a test molecule which binds to the MSP-1 polypeptide and inhibits binding of the MSP-1 polypeptide to the polypeptide of claim 1 is a candidate mimetic of the isolated polypeptide of claim 1.

9. A protein microarray comprising at least one isolated Band 3 polypeptide selected from the group consisting of SEQ ID NOS. 1, 2, 3, and 4.

10. An anti-Band 3 antibody or fragment thereof that selectively binds to a polypeptide of claim 1, wherein the antibody inhibits infection of cells by *P. falciparum* merozoite malaria parasite.

11. An anti-idiotype antibody which selectively binds to the idiotype of the antibody of claim 10.

12. A method for making an anti-idiotypic antibody comprising:

immunizing an animal with an antibody of claim 10 under conditions to elicit an immune system response to an idiotype of said antibody of claim 10.

13. A method for treating a malaria infection, comprising:

administering to a subject in need of such treatment, an effective amount of an anti-Band 3 antibody of claim 10 to treat the malaria infection.

14. A method for inducing an immune system response to treat a malaria infection, comprising:

administering to a subject in need of such treatment, an effective amount of an anti-Band 3 antibody of claim 10 under conditions to induce an anti-idiotypic immune response to the anti-Band 3 antibody idiotype.

15. A method for identifying a candidate mimetic of a MSP-1 polypeptide, comprising

providing an isolated Band 3 polypeptide which binds a MSP-1 polypeptide,

contacting the Band 3 polypeptide with a test molecule, and

determining the binding of the test molecule to the Band 3 polypeptide, wherein a test molecule which binds to the isolated Band 3 polypeptide and inhibits binding of the Band 3 polypeptide to the MSP-1 polypeptide is a candidate mimetic of the MSP-1 polypeptide.

16. The method of claim 15, wherein the MSP-1 polypeptide has a sequence selected from the group consisting of SEQ ID NO:11, SEQ ID NO:12, SEQ ID NO:13, SEQ ID NO:33, SEQ ID NO. 34, and SEQ ID NO:35.

17. The method of claim 15, wherein the test molecule is an antibody.

18. An isolated polypeptide, wherein the polypeptide comprises an amino acid sequence selected from the group consisting of SEQ ID NOs:11, 12, 13, 33, 34, and 35, or fragments thereof.

19. A pharmaceutical composition comprising:

one or more isolated polypeptides of claim 18 and

a pharmaceutically acceptable carrier;

wherein the polypeptides are present in an effective amount to induce an immune system response.

20. The pharmaceutical composition of claim 19, further comprising an adjuvant.

21. A method of making a medicament, comprising:

placing one or more isolated polypeptides of claim 19 in a pharmaceutically acceptable carrier.

22. A method of preventing or treating a malaria infection, comprising administering a pharmaceutical composition of claim 19 to a subject in need of such treatment in an amount effective to prevent or treat the malaria infection.

23. A malaria polypeptide binding polypeptide that selectively binds to a isolated malaria polypeptide of claim 18, wherein the binding polypeptide is an antibody or antigen-binding fragment of an antibody.

24. A pharmaceutical composition comprising the malaria polypeptide binding polypeptide of claim 23, in a pharmaceutically acceptable carrier.

25. A method of preventing or treating a malaria infection, comprising administering the pharmaceutical composition of claim 24 to a subject in need of such treatment in an amount effective to prevent or treat the malaria infection.

26. An isolated nucleic acid, wherein the nucleic acid molecule comprises a nucleotide sequence selected from the group consisting of SEQ ID NOs:54-59, or fragments thereof.

27. An isolated Band 3 polypeptide, comprising an amino acid sequence selected from the group consisting of SEQ ID NO. 1, 2, 3, and 4 as shown herein:

SEQ ID NO:1: GMPWLSATTVRSVTHANALT (also referred to herein as sequence $B3_{5A}$);

SEQ ID NO:2: SVTHANALTVMGKASTPGAA (also referred to herein as sequence $B3_{5B}$);

SEQ ID NO:3: GKASTPGAAAQIQEVKEQRI (also referred to herein as sequence $B3_{5C}$);

SEQ ID NO:4: DRILLLFKPPKYHPDVPYVK (also referred to herein as sequence $B3_{6A}$), and unique fragments thereof, wherein the unique fragments

(1) bind to an isolated polypeptide comprising an amino acid sequence selected from the group consisting of SEQ ID NOs:46-53, or fragment thereof, and

(2) exclude the sequences set forth in Table 4:Band 3 Blast Homology Sequences.

28. An isolated nucleic acid molecule that encodes the isolated Band 3 polypeptide of claim 27.

29. An expression vector comprising the isolated nucleic acid of claim 29 operably linked to a promoter.

30. A host cell transfected or transformed with an expression vector of claim 29.

31. An immunogenic composition comprising:

one or more isolated Band 3 polypeptides of claim 27 and

a pharmaceutically acceptable carrier;

wherein the Band 3 polypeptides are present in an effective amount to induce an immune system response.

32. The composition of claim 31, further comprising an adjuvant.

33. A method of making a medicament, comprising:

placing one or more isolated Band 3 polypeptides of claim 27 in a pharmaceutically acceptable carrier.

34. A method for identifying a candidate mimetic of an isolated Band 3 polypeptide of claim 27, comprising

providing a malaria polypeptide comprising an amino acid sequence selected from the group consisting of SEQ ID NOs:46-53, or fragment thereof that binds the isolated Band 3 polypeptide or fragment thereof of claim 27,

contacting the malaria polypeptide or fragment thereof, with a test molecule, and

determining the binding of the test molecule to the malaria polypeptide or fragment thereof, wherein a test molecule which binds to the polypeptide or fragment thereof and inhibits binding of the isolated Band 3 polypeptide to the malaria polypeptide, is a candidate mimetic of the isolated Band 3 polypeptide of claim 27.

35. A method for identifying a candidate mimetic of an isolated malaria polypeptide, comprising

providing a Band 3 molecule which binds a malaria polypeptide comprising an amino acid sequence selected from the group consisting of SEQ ID NOs:46-53,

contacting the Band 3 molecule with a test molecule, and

determining the binding of the test molecule to the Band 3 molecule, wherein a test molecule which binds to the Band 3 molecule and inhibits binding of the malaria polypeptide with the Band 3 polypeptide is a candidate mimetic of the malaria polypeptide.

36. The method of claim 35, wherein the test molecule is an antibody.

37. An isolated polypeptide molecule comprising an amino acid sequence selected from the group consisting SEQ ID NOs:46-52.

38. A pharmaceutical composition comprising:

one or more isolated polypeptides of claim 37 and

a pharmaceutically acceptable carrier;

wherein the polypeptides are present in an effective amount to induce an immune system response.

39. The pharmaceutical composition of claim 38, further comprising an adjuvant.

40. A method of making a medicament, comprising:

placing one or more isolated polypeptides of claim 38 in a pharmaceutically acceptable carrier.

41. A method of preventing or treating a malaria infection, comprising administering a pharmaceutical composition of claim 38 to a subject in need of such treatment in an amount effective to prevent or treat the malaria infection.

42. A malaria polypeptide binding polypeptide that selectively binds to a isolated malaria polypeptide of claim 37, wherein the binding polypeptide is an antibody or antigen-binding fragment of an antibody.

43. A pharmaceutical composition comprising the malaria polypeptide binding polypeptide of claim 42, in a pharmaceutically acceptable carrier.

44. A method of preventing or treating a malaria infection, comprising administering the pharmaceutical composition of claim 43 to a subject in need of such treatment in an amount effective to prevent or treat the malaria infection.

45. An isolated nucleic acid molecule selected from the group consisting of:

(a) nucleic acid molecules which hybridize under stringent conditions to a nucleic acid molecule comprising a nucleotide sequence selected from the group consisting of SEQ ID NO:38-44 and which codes for a *Plasmodium* polypeptide,

(b) deletions, additions and substitutions of the nucleic acid molecules of (a), which code for a *Plasmodium* polypeptide,

(c) nucleic acid molecules that differ from the nucleic acid molecules of (a) or (b) in codon sequence due to the degeneracy of the genetic code, and

(d) complements of (a), (b) or (c).

46. The isolated nucleic acid molecule of claim 45, wherein the isolated nucleic acid molecule comprises a nucleotide sequence selected from the group consisting of SEQ ID NO:38-44.

47. An isolated nucleic acid molecule selected from the group consisting of:

(a) a unique fragment of the nucleotide sequence selected from the group consisting of:

nucleotides 1-1287 of SEQ ID NO:38 between 12 and 1286 nucleotides in length,
nucleotides 1-3576 of SEQ ID NO:39 between 12 and 3557 nucleotides in length,
nucleotides 1-903 of SEQ ID NO:40 between 12 and 902 nucleotides in length,
nucleotides 1-1203 of SEQ ID NO:41 between 12 and 1202 nucleotides in length,
nucleotides 1-3996 of SEQ ID NO:42 between 12 and 3995 nucleotides in length, and
nucleotides 1-876 of SEQ ID NO:43 between 12 and 875 nucleotides in length, and
nucleotides 1-2712 of SEQ ID NO:44 between 12 and 2711 nucleotides in length, and

(b) complements of (a),

wherein the unique fragments exclude nucleic acids having nucleotide sequences that are contained within SEQ ID NO:38-44, and that are known as of the filing date of this application.

48. An expression vector comprising the isolated nucleic acid molecule of claim 46 operably linked to a promoter.

49. An isolated polypeptide molecule comprising a unique fragment of amino acid sequence SEQ ID NO:53 that binds to a Band 3 polypeptide.